

the subject has been laid under contribution, and the materials thus obtained worked up into a connected whole with great care and in the clearest and most intelligible manner. Mr. Balfour has appended to each section and subsection of his work a bibliography of the memoirs cited in it; and as these are cited throughout by consecutive numbers, he has reprinted all the separate bibliographies in a connected list at the end of the volume. This is exceedingly convenient for reference. The book is also freely illustrated with woodcuts, most of which are very good, and many of them beautifully executed.

In this first volume only the Invertebrata are treated of; the second, which we hope will not be long in making its appearance, will deal with the Vertebrate animals from the same phylogenetic point of view which is adopted in the present volume, and will also treat of another special department of the general subject, namely the evolution of organs. When completed, the book will certainly constitute one of the most important of recent contributions to the literature of zoology; and whether the author's fear that his attempt at a systematic exposition of the facts of embryology may be regarded in some quarters as "premature" proves to be well founded or not, we are quite sure that the gratitude of those to whom his book will be a perfect godsend will far outweigh any cavils that may be raised against it.

Memoirs of the Science Department, University of Tokio, Japan.
Vol. I. Part 1. *Shell-Mounds of Omori.* By EDWARD S. MORSE, &c. 4to. 36 pp., with 18 plates. Published by the University, Tokio, Japan. Nisshuska Printing-office. 2539 (1879).

THE Japanese have taken up the study of Archæology with warmth and earnestness. A native Archæological Society flourishes at Tokio, the Government interdicts the exportation of the antiquities of the country; and it is hoped that the ancient temples, monuments, gateways, idols, and tombs of Japan will be officially protected. Both from its many antiquities and the fidelity of its very ancient records of civilization and history (for nearly, if not quite, two thousand years), Japan is eminently favourable to the study of archæology. The enthusiastic pursuit of science in modern Japan, the institution of the University of Tokio, the advent of many first-class teachers of philosophy and science, and the cultivation of observing and thinking minds among the many willing native students, have given a high standing to all those connected with this state of progress among our scientific brethren in the North Pacific.

The Professor of Zoology at the University of Tokio, Mr. E. S. Morse, had ardently studied prehistoric shell-heaps in Maine and Massachusetts, U.S., for several years in company with Profs. Jeffries Wyman and F. W. Putnam; and he was not long in discovering a large shell-mound on the Yokohama railway at Omori, about six

miles from Tokio. With the ready and sympathetic aid of his friends and colleagues, the officials, professors, and students of the University, a very extensive collection of pottery, ornaments, tablets, implements (horn, bone, and stone), bones, and shells was made and arranged; and with the careful and obliging cooperation of Japanese scholars, artists (draughtsmen and lithographers), and printers Prof. Morse has been enabled to produce this excellent fasciculus. It is neatly printed, profusely illustrated, and published altogether in a highly creditable form by the Japanese. The paper being of native manufacture, we may note that, from the composition (by printers unacquainted with English) to the binding, the mechanical production is entirely Japanese.

Excepting the Japanese "imprimatur" and Japanese titles and numerals on the plates (to allow of their being used in a native translation of the work), there is nothing but European appearances about it.

The length of the prehistoric shell-deposit exposed by the railway-cutting is about 89 metres, with a thickness of 4 metres in one place. Another exposure occurs about 95 metres off; and cultivated fields to the south bear evidence of similar deposits. The mound or mounds are nearly half a mile from the shores of Yedo Bay. In some places the sea has receded about six miles in this bay. The former contiguity of these and other shell-mounds to river-banks or sea-coasts, and, in the latter case, the frequent proofs of the local retreat of the sea, are carefully insisted upon.

Objects (implements) found at Omori are:—*Earthen*: cooking-vessels, hand-vessels, ornamental jars, ornamental bead, tablets, spindle-whorl (?), and disk, shaped from the bottom of broken vessel. *Stone* (lava, slate, schist, and jasper): hammers, celts, rollers, skin-dresser (?), and mortar. *Horn*: awls, handle, prongs of deers' antlers, and implements of unknown use. *Bone*: fish-spine needles, bird-bone with two lateral holes, cube from deer's metatarsal, and deer's *os calcis*, probably used as a handle. *Miscellaneous*: arrow-point from boar's canine, and shells used as paint-cups.

Objects (implements) found in other kitchen-middings, but not found at Omori: flint or obsidian implements, arrow-heads, spear-points, scrapers, skinning-knives, mortars and pestles (?), drilling-stones, ornamental stones, stone net-sinkers, pipes, worked shell, wampum, stone beads.

Of bones found at Omori there are remnants of those of man, ape (?), monkey, deer, boar, wolf, and dog, also of a large cetacean and a large tortoise, and of small mammals, of birds, and of fishes. The human bones bear evidence of having been subjected to cannibalism. A fragment of one platycnemic tibia was discovered at Omori; but several were subsequently found in an immense shell-mound at Onomura, in the province of Higo, Island of Kiushiu. Prehistoric shell-deposits are also known at Otaru, on the western coast of Yezo, Hakodate; several also within the city limits of Tokio. These will be described subsequently; but, as far as com-

parisons have been made of their contents, they appear much to resemble those of Omori, and, like it, are of very remote antiquity.

In one case, however, the removal of part of a canal-bank, made 230 years ago, exposed a shell-heap composed of species *still extant*, without any *ancient* pottery; hence the extinction of the old species found in the mounds of Omori and elsewhere, and the changes of sea-level, were certainly before, probably long before, that date.

The comparison of the Omori pottery with that found in other parts of the world, and the comparison of the ancient with the modern fauna of Omori, are full of interest, and have been worked out with the acumen and experience of a well-trained naturalist and antiquary.

The following is the list of Gasteropods found at Omori:—

<i>Fusus inconstans</i> , <i>Lischke</i> .	<i>Potamides</i> , sp.
<i>Rapana bezoar</i> , <i>Linné</i> .	<i>Lampania</i> , sp.
<i>Hemifusus tuba</i> , <i>Gmelin</i> .	<i>Natica Lamarckiana</i> , <i>Duclos</i> .
<i>Purpura luteostoma</i> , <i>Chemnitz</i> .	<i>Turbo granulatus</i> , <i>Gmelin</i> .
<i>Eburna japonica</i> , <i>Lischke</i> .	<i>Rotella globosa</i> , <i>Gmelin</i> .
<i>Nassa</i> , sp.	

Of the Lamellibranchs in the old mounds there are:—

<i>Arca subrenata</i> , <i>Lischke</i> .	<i>Cytherea meretrix</i> , <i>Linné</i> .
— <i>inflata</i> , <i>Reeve</i> .	<i>Tapes</i> , sp.
— <i>granosa</i> , <i>Linné</i> .	<i>Solen strictus</i> , <i>Gould</i> .
<i>Dosinia Troscheli</i> , <i>Lischke</i> .	<i>Lutraria Nuttali</i> , <i>Cowad</i> .
<i>Cyclina chinensis</i> , <i>Chemnitz</i> .	<i>Ostrea denslamellosa</i> , <i>Lischke</i> .
<i>Mactra veneriformis</i> , <i>Deshayes</i> .	—, sp.
<i>Mya arenaria</i> , <i>Linné</i> .	

The absence (in the old mounds) of edible species now existing in the neighbouring sea shows that, in all probability, a new or modified fauna has come in since the period of these kitchen-middings. So also the relatively large and luxuriant growth (for the most part) of both the shells of mollusks and the bones of mammals found in these mounds have reference to long-past time, previous to the introduction of stages of degeneracy due to changed conditions either of nature or civilization.

An Introduction to the Study of Fishes. By ALBERT C. L. G. GÜNTHER. Svo. Edinburgh: A. and C. Black, 1880.

OWING to the author's connexion with this journal, we must abstain from giving an ordinary notice of the present volume. We think it due to our readers, however, to call their attention to its appearance, and to indicate its nature in very general terms.

Dr. Günther's work is founded on the notes and other materials got together by him for the preparation of the article "Ichthyology" in the new edition of the 'Encyclopedia Britannica,' and may therefore be regarded to some extent as an expansion of that article. He commences with a history of ichthyological research, which is followed